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# **A Library for Engineering Education: Frank O. Marvin and the University of Kansas, 1875–1915**

*James D. Neeley*

This article investigates the influence of developments in engineering education on the establishment of departmental libraries for engineering in late-nineteenth- and early-twentieth-century American universities. A case study is made of the University of Kansas and Frank O. Marvin, a former president of the Society for the Promotion of Engineering Education and dean of the university's School of Engineering when its library opened in 1909. While national forces spanning the profession supplied the necessary preconditions for Kansas's library, Marvin was the local catalyst. His beliefs about what attributes the successful engineer should possess and how a liberal education could produce those attributes made the library inevitable.

In 1909, when the new Engineering Building opened at the University of Kansas, a spacious library was included on the first floor. Down the hall in the School of Engineering offices, posing at his desk for the alumni magazine photographer, Frank Olin Marvin (1852–1915) exhibited an air of commanding serenity that belied recent history (figure 1).<sup>1</sup> Less than three years earlier, the university's chancellor had publicly described the school's existing quarters as "absurdly inadequate." After offering engineering courses for more than forty years, the school's enrollment had reached four hundred, but with still no building to call home, classes were scattered across campus in attics, basements, and other facilities. Coincidentally, in the same year as the chancellor's remark, a survey of the university's physical plant had described its main library, where most engineering books were housed, as "ample for the present needs."<sup>2</sup> His school desperate for classroom and laboratory space and the main library ample for the present needs, Marvin nevertheless chose to put a departmental library in his new building.

What explains this counterintuitive result? Several authors have addressed the origins of the academic departmental library as a type;<sup>3</sup> however, case studies of the factors leading to the creation of



*Figure 1.* Frank O. Marvin, dean of the University of Kansas School of Engineering, in his office in the new engineering building, Marvin Hall, ca. 1910. Because of Marvin's influence, the new building included a department library, the first for the engineering school. (*Kenneth Spencer Research Library, University of Kansas Libraries*)

specific libraries are rare, especially studies examining the reasons for establishing engineering libraries.<sup>4</sup> Yet engineering libraries appeared during the late nineteenth and early twentieth centuries at many American universities, including Columbia, Cornell, MIT, Illinois, Wisconsin, Michigan, Pennsylvania, Nebraska, Iowa State, and Missouri, all of which had such libraries before Kansas (see the appendix). As a case study, Kansas's library may be typical, for it was neither the first nor the largest, and it had no precious collections, notable staff, or benefactor to give it distinction. Rather, like other early engineering libraries, its establishment was influenced by national developments in engineering education, with Marvin the local exponent of these trends. While the necessary preconditions for an engineering library at Kansas were national forces spanning the profession, Marvin was the local catalyst. His beliefs about what attributes the successful engineer should possess and how a liberal education could produce those attributes made the library inevitable.

With engineering enrollments across the country expanding dramatically and methods, goals, and standards debated continually, the Society for the Promotion of Engineering Education (SPEE) was founded in

1893. Marvin, who served as SPEE president in 1900–1901, extended themes he had advanced earlier as vice president of the American Association for the Advancement of Science (AAAS), Section D—Mechanical Science and Engineering, and later as president of the Kansas Academy of Science. His thinking reflected national developments at the same time it tried to influence them.

Marvin's ideas grew out of his own education, interests, and personality. His education began at Allegheny College, where he took the scientific course of study, graduating in 1871 with a bachelor of arts degree.<sup>5</sup> As Allegheny did not have an engineering program until 1885, Marvin would become one of the many engineering educators of his time who lacked a formal education in the discipline, studying mathematics and science instead.<sup>6</sup> The professor of natural science at Allegheny, Jeremiah Tingley, was a lasting influence on Marvin. According to another Tingley student of the time, Tingley regaled his devotees "with fresh scientific thought, the inventions and discoveries which were stirring the world." Tingley was also an energetic collector of books on behalf of the library, and Allegheny's was outstanding. In 1876 Allegheny held eight thousand volumes, more than three times as many as the University of Kansas. When Marvin arrived at Kansas in 1875, he noticed the difference immediately, writing that "the increasing of our library in extent and range [is one of] the pressing and most important needs of our University."<sup>7</sup>

After college Marvin acquired his practical engineering training in the field, working for a Kansas railroad and for the city engineer of Kansas City. Later in his career Marvin served in consulting capacities to municipalities, government agencies, and corporations.<sup>8</sup> As his 1912–13 *Who's Who in America* entry shows, Marvin was proud of his practical experience as a qualification for teaching. In 1878 Marvin was appointed assistant professor of mathematics, physics, and civil engineering at the University of Kansas. As the engineering program developed, so did Marvin's responsibilities. In 1891 the School of Engineering was formed, and in 1893 Marvin was elected its first dean, a position he would hold for the next twenty years.<sup>9</sup>

### **Engineering Education in the United States in the Late Nineteenth and Early Twentieth Centuries**

The period of the late 1800s and early 1900s was a glorious era for engineering. The time span of Marvin's career (1875–1915) witnessed

such engineering triumphs as the internal combustion engine and the Model T automobile, the first powered flight at Kitty Hawk, the light bulb, telephone, and radio, the skyscraper, the Panama Canal, and the Brooklyn Bridge. One historian described the mood of the time:

To be an engineer in 1902, or at any time between 1850 and 1950, was to be a participant in a great adventure, a leader in a great crusade. Technology, as everyone could see, was making miraculous advances, and, as a natural consequence, the prospects for mankind were becoming increasingly bright.

Every few months, it seemed, some new technological marvel was unveiled and greeted with wild public enthusiasm. . . .

The completion of sizable technological undertakings was marked with celebrations fitting for an armistice or a coronation. . . .

In the late 1800s engineers began to appear regularly as heroes in novels and short stories.<sup>10</sup>

Marvin's tenure as dean at Kansas (1893–1913) was a period of tremendous growth in engineering education as schools everywhere tried to meet the demands of students attracted by the profession's success and the needs of new industries it had created.<sup>11</sup> Engineering enrollment grew from about 9,600 students in 1898–99 to about 30,300 in 1909–10, an increase of more than 200 percent in ten years.<sup>12</sup> At the University of Kansas engineering enrollment grew from fewer than one hundred to more than four hundred students while Marvin was dean.<sup>13</sup> The quality of an engineering education also improved. In earlier times schools had carried out practical engineering training through shop work, drafting, and field exercises. But toward the end of the nineteenth century the science courses and laboratory instruction assumed greater importance. The emergence of the new fields of electrical and chemical engineering hastened this trend, as most faculty in these fields had been trained as physicists and chemists rather than as engineers.<sup>14</sup>

Many complex issues followed growth, and the need for a coordinated approach to these issues provided the impetus for the creation of SPEE (now the American Society for Engineering Education) at the International Congress on Engineering at the World's Columbian Exposition in 1893. SPEE "promptly drew to itself the leading spirits in engineering education. . . . Beyond question the moral influence of this organization was a primary force in preserving the norm of high scholastic standards and the ideal of a relatively liberal, collegiate type of curriculum." Marvin attended the congress and was elected to a

three-year term on SPEE's executive council and to another term in 1897. He served as president in 1900–1901.<sup>15</sup>

Two issues were so important to Marvin that they formed the theme of his presidential address, “The Cultural Value of Engineering Education”: the place of liberal education in the technical engineering curriculum and the influence of the needs of industry on the curriculum. “There seem to be certain fundamental qualities which must be possessed before a man can be classed with cultured people, qualities which are only acquired after a considerable experience in life, but which are influenced greatly by the years of student training.”<sup>16</sup> Among these qualities, he said, is the ability of students to do their own thinking, form their own judgments, develop effective skills in the English language, and acquire an appreciation for beauty. Marvin insisted that these qualities were not ornamental but essential. His explanation led to his primary theme, one he included in all his most important writings: that the cultured engineer had unequaled executive potential in business and public enterprise but that a liberal education was necessary to realize that potential. His first published statement of this theme had appeared seven years earlier in an article entitled “Common Requirements for Admissions to Engineering Courses”:

The professional engineer of today is called to assume a place among men of power, of culture and refinement. If he is to stand well among his peers and win from them a hearty recognition, he must not only have the power that comes from an intensive study of things that are of acknowledged utility, but also the breadth of view, the sympathy with the best life about him, that can only be attained through a liberal course of study. . . . The Mathematics, the Drawing, the Physics and the Chemistry are essentials for the subsequent technical study. The Literature, the Languages and the History are equally essential for the engineer as a man among men.<sup>17</sup>

Antecedents of Marvin's thinking were found in his *Papers on Education*, a collection of articles he compiled that were especially significant for him. The volume begins with Thomas C. Clarke's 1874 “The Education of Civil Engineers” and includes A. L. Holley's 1876 “On the Inadequate Union of Engineering Science and Art.” Both of these are historically important expressions of concern over the “divorce [of] engineering schools from both scientific and liberal studies.”<sup>18</sup>

Fueling this concern was industry's increasing demand for graduates with specialized training.<sup>19</sup> At Kansas, for example, the only engineering

course offered until 1887 had been in civil, but by 1909 municipal and sanitary, electrical, mechanical, mining, and chemical had been added. Eventually, these were further subdivided. In civil engineering options became available in railway, structural, and municipal and sanitary engineering.<sup>20</sup> Specialization mattered for libraries because each new engineering specialty required its own textbooks, professional journals, monographs, and handbooks.<sup>21</sup>

Other trends included the increasing number of engineers being hired by large corporations and government agencies. By 1925, 70 percent of the country's graduating engineering classes of 1904 and 1909 held positions in ownership, executive, and administrative work, including sales; only 17 percent remained in technical positions.<sup>22</sup> Marvin believed engineering educators could enhance an engineer's executive potential by strengthening liberal studies in the curriculum—and by educating students on the value of a library. His own appreciation of libraries dated from his undergraduate years at Allegheny College, where the liberal education he received helped shape his professional perspectives. The ensuing transformations in engineering education and the engineering profession complemented his predisposition to provide students with an engineering library. Thus, when planning a new engineering building presented the opportunity, he seized it. These factors alone did not bring about the engineering library at Kansas, but they created a situation wherein the library was valued and the need for it recognized. Without them, the library would not have appeared when it did.

Preparing the way for the establishment of engineering libraries was the enormous expansion in the scale and scope of engineering education. Other compelling influences on Marvin's decision to establish an engineering library included the students' need for a library near their classrooms, the influence of Marvin's colleagues, new approaches to teaching, an ever greater emphasis on engineering literature and research, and institutional competition and growth.

### **Why the Engineering Library Came to Be: Traditional Explanations**

The main library's distance from academic departments is the reason most often given for the establishment of departmental libraries. The distance from the new engineering building to Kansas's main library was about four-tenths of a mile, or nine minutes at a moderate pace along the boulevard through campus. "The users of books are sometimes willing to traverse some distance to obtain them, be it a minute's walk or a mile . . .," wrote a thoughtful observer in 1912, "but they more

often decline. . . . [T]hey are busy workers, impatient of loss of time and intolerant of inconvenience. . . . The books must be close at hand.”<sup>23</sup>

In 1877 the university’s sole library was in the same building as the engineering classrooms—the main building, later named Fraser Hall. The books were arranged on shelves in alcoves, an arrangement typical of early academic libraries.<sup>24</sup> An 1880 catalog of its collection listed 167 engineering volumes shelved alongside mathematics and science in the Fourth Alcove.<sup>25</sup> In 1888, echoing his earlier call for “increasing of our library in extent and range,” Marvin submitted to the university’s board of regents an audacious request for books on civil engineering and “related subjects” at a total cost of \$2,700. (At an average price of \$5.60, that amount would have purchased 482 volumes.) Fifteen years earlier, in 1873, \$3,000 had been requested for books for all university departments. The legislature appropriated just half that amount, and engineering’s share was just \$200. Engineering received comparable amounts through the end of the nineteenth century, Marvin’s audacity notwithstanding. An allocation specifically to purchase engineering books, a catalog that listed them separately, a designated alcove where they could be found, and a faculty member attentive to their increase all enhanced the potential for a separate library in the future.<sup>26</sup>

In 1887 the university’s library was moved to larger quarters in the north end of the main building, where the engineering books continued to be shelved together in an identifiable alcove. This separate identity was lost, however, when a freestanding library building was opened in 1894. Instead of alcoves, the new Spooner Library had a central stack that—to make it fireproof—was cut off from the reading room. Thus, students lost free access to the shelves they had previously enjoyed. The books were arranged according to Dewey classification, so even when special permission to enter the stack was obtained, finding books required use of the dreaded and as yet unfinished card catalog.<sup>27</sup> And the library’s location in a separate building meant it was a few minutes’ walk from the students’ classrooms and laboratories. The first departmental library used by engineering students appeared the next year, in 1895, on the first floor of the new Physics and Electrical Engineering Building.<sup>28</sup> Its immediate accessibility to students with classes and laboratories in the same building contrasted sharply with the complications that the civil engineering students faced with their books in Spooner’s stacks and their classrooms and labs in Fraser. The advantages of the departmental library arrangement could not have escaped Marvin’s notice.

Overcrowding and other deficiencies of university main libraries, particularly the collections’ increasing size and complexity, often enhanced



the appeal of the departmental arrangement. But other than distance, few criticisms were likely to have been made of Kansas's handsome general library. Spooner was designed by Henry Van Brunt and is considered by some to be "his most mature and successful work." Van Brunt, one historian believes, was "probably the best informed architect of his time regarding the needs of academic libraries. . . . Functionally this was quite a successful library."<sup>29</sup> It was a library that Marvin, with his passions for art and engineering, would have appreciated. But by 1907 he knew that the library was more than half full, and, with collections growing at an increasing rate, he might have calculated just how long Spooner would remain "ample for the present needs," as the 1906 survey described it.<sup>30</sup> A national survey of departmental libraries serving engineering schools, although not including Kansas's and not published until 1912, is still pertinent to Kansas's situation before 1909: "At one or two institutions the general university library is still thought sufficient. There is no doubt as to the value of a general library to an engineering student, . . . but its distance from engineering laboratories even on the most crowded campus, and its organization in the interest of general readers, make a department library essential also."<sup>31</sup>

Another traditional explanation for the appearance of departmental libraries is the use of the seminar method of instruction, which took place in "seminaries" of students and professors. A seminary was a group of advanced students working closely with the professor to analyze as many of the authorities on a given subject as possible, reporting findings to the group, and documenting these by presenting the sources themselves. Seminars required books. The method, which originated at the University of Berlin, gained wide popularity in America during the late nineteenth century, and many seminary libraries evolved into departmental libraries.<sup>32</sup> Seminars were used in engineering, though not as often as in other fields. "The method has many points of merit. . . . It makes [the student] familiar in the proper way with the library, with books themselves, materials from which the engineer will find it necessary to acquire much information and instruction," wrote a professor of railroad engineering at MIT who was president of SPEE in 1903–4.<sup>33</sup> At Kansas an electrical seminary and a chemical and mineralogical seminary met in the mid-1890s. Seminars encouraged the establishment of student engineering societies. The first engineering society at Kansas had been organized in 1882, but by 1907 there were societies in civil, electrical, and mechanical engineering "for the review of current engineering literature or . . . for the discussion of engineering topics."<sup>34</sup>

## **Why the Engineering Library Came to Be: Developments in Engineering Education**

### *The Example of Scientist Colleagues*

Two of Marvin's most notable colleagues at Kansas were advocates of the seminar method. In 1887 the electrical engineering program was begun under Lucien I. Blake, who had studied physics at the University of Berlin. He was ambitious and quickly added new courses, lectured widely, and developed influential contacts. Blake, a highly successful inventor and director of his own engineering companies, was described by Marvin as "magnetic and attractive in personality" and "an enthusiastic teacher."<sup>35</sup> In 1892 Erasmus Haworth joined the faculty as professor of geology and mineralogy, having done his doctoral work at Johns Hopkins. Haworth founded the Department of Mining Engineering in 1899 and taught economic geology for many years. He also served as state geologist from 1894 to 1915 and as director of the Kansas Geological Survey from 1895 to 1915. Haworth was an influential advisor to businesses seeking to develop Kansas's mineral resources, especially oil and gas.<sup>36</sup>

As models of successful engineering educators, professional engineers, and men of affairs, Blake and Haworth surely influenced Marvin. Both were ambitious and successful in teaching and research, developed strong programs in their fields of engineering at Kansas, and were extremely popular with their students. Both were active consultants for business or government, and both eventually left the university to pursue success in commercial ventures (Haworth not until 1920). Trained as physical scientists, they held doctorates from important universities that were leaders in utilizing the seminar method.<sup>37</sup> When Blake and Haworth had opportunities to plan new buildings for their departments, both included libraries.

The Physics and Electrical Engineering Building (later Blake Hall), completed in 1895, included a departmental reading room and library on the first floor, in accordance with Blake's plans. The 1908 *Annual Catalogue of the University of Kansas* included a description of the department library: "[It] contains the more important English, German and French periodicals, with bound volumes for thirty years or more . . . and a number of other journals, especially along the lines of applied electricity. The library also contains a good number of standard treatises, both elementary and advanced, as well as the collected papers of

Maxwell, Faraday, Kelvin, Rowland, and others.”<sup>38</sup> The Geology and Mining Building (later Haworth Hall) was completed in 1909 and contained a library on the third floor, as specified by Haworth. “The library is of first importance for equipment in geology, and apparatus and museums next. The library includes practically all the reports of public surveys in America, both national and state, reports of many foreign surveys, and all the leading textbooks and special treatises by the leading authorities of the world.”<sup>39</sup>

### *The Increasing Importance of Engineering Literature*

By the 1890s leading engineering educators were advocating that students engage the technical literature and begin building their own professional libraries. One engineering professor told his colleagues in 1893, “Students should be encouraged to subscribe for and to read regularly an engineering journal, as well as to consult the columns of those which are taken in the library. The various indexes of literature should be pointed out to him and instructions be given in their use.” Another educator commented, “This thirst for professional knowledge and the habit of acquiring it, or of acquiring the books and journals containing it, is a fair test of the efficiency of their school training.”<sup>40</sup> Both these statements were by professors of civil engineering who later became presidents of SPEE. To their minds, clearly, engineering education needed libraries.

There was a rapidly expanding amount of technical literature to acquire. In 1911 a former manager of the *Engineering News* said, “Two generations ago, engineering literature, as we know it, was practically nonexistent; today, there are several hundred weekly and monthly technical publications; there are hundreds of engineering societies . . . many of which publish periodic proceedings. . . . Add to this the avalanche of new books on engineering subjects.” The *Descriptive Index of Current Engineering Literature* listed 100 publications and 1,375 entries per year in its 1884–91 cumulation. By 1901–5 its successor, *Engineering Index*, listed 250 publications and 10,000 entries per year. Educators realized the implication for engineering education: “The current literature on all technical subjects is becoming as vast as it is valuable. . . . It is extremely important that our students should become somewhat acquainted with the most fertile sources of engineering literature while they are in college.”<sup>41</sup>

The challenge was recognized at the 1901 SPEE conference in a paper by Charles F. Burgess, who argued that members should recommend books for librarians to purchase. Marvin, who was president that year,

appointed a committee and requested cooperation from the American Library Association (ALA). Burgess spoke at the ALA annual conference the next year, and his 1903 report, announced in the *Library Journal*, included an annotated list of 340 titles classified into 25 subjects. A revised list appeared in 1906.<sup>42</sup>

### *Teaching English to Engineers*

Toward the end of the nineteenth century there was growing concern about the inadequate English language skills of graduating engineers, therefore reinforcing the importance of a liberal education in an engineering context. Marvin was among those who recognized the need for a “new kind of English course, a specifically *engineering* English course.”<sup>43</sup> In “Cultural Value” he wrote:

It is not sufficient to form correct judgments only; there must be added a skillful and effective presentation of them in well chosen and fitting English. The ability to do this involves more than training in the writing of compositions, themes, forensics and reports. The cultured man should have a taste for reading the best that has been written in his mother tongue and for several reasons: the great thoughts of great minds are stimulating and broadening to his own mind; he therefore absorbs a knowledge of words and their shades of meaning; he gains an appreciation of style and insensibly better knows how to form his own.<sup>44</sup>

Leaders in technical writing instruction advocated a role for the engineering library. “The graduate . . . will profit by the study of the literature of the past. But even the various subjects in literature must be shaped entirely for engineers. . . . [T]he engineer simply needs to learn how to use a library as a means of mastering new subjects and to gain a clear idea of the value and the interest which the past has stored up for him,” an educator told his colleagues in 1911. Another wrote: “The constructing of bibliographies should acquaint him not only with the general bibliographies, such as ‘Poole’s,’ ‘The A.L.A.,’ ‘The Reader’s Guide,’ but with the specially scientific and technical, such as ‘The Engineering Index,’ ‘Science Abstracts.’”<sup>45</sup>

Engineering schools even began forming their own English departments. In 1903 Marvin persuaded Frederic N. Raymond to teach English courses to the engineers, and by 1916 Raymond had established Kansas as one of the “early centers of interest in technical writing.”<sup>46</sup> “The great

practical aim of a course of training . . . ,” he said, “is that [the student] be able to give other men information which will be useful to them and in such shape that they can use it.” Required courses included Advanced Composition: “practice in the gathering and analyzing of material, and in the presentation of information and opinion in scientific papers, and the study of the methods used in these and other papers.” By 1913 Raymond was teaching an optional three-credit course called The Literature of Engineering and Science: “reading and research in the material of the libraries, with indexing and reports.” When the School of Engineering established a library committee in 1912, Raymond was appointed chair.<sup>47</sup>

### *Requirement for Student Research*

Graduation theses were universally required of engineering students in the 1890s, and library research was usually involved. By 1918 they were still required in nearly half of the schools, Kansas among them.<sup>48</sup> At Kansas student technical reports and theses involved library research, and copies were retained in the library. However, they were composed as though intended for a professional audience and so rarely contained bibliographies, literature reviews, or other explicit evidence of library use.<sup>49</sup> Theses were required for all graduate degrees in engineering, offered at Kansas since 1897 but not awarded until 1910 and 1911. The master of science degree required a “scholarly” thesis, and the professional master’s degree an “engineering” one.<sup>50</sup> The bibliographies of most early theses (1910–15) contained from a few to more than forty listings each, including professional news magazines, journals, transactions, proceedings, reports, catalogs, and books.

As the curriculum became more science based, laboratory instruction became a necessity. “Now we are in an age of laboratories,” wrote a future SPEE president in 1896. “They are provided for testing all important properties of materials on the largest scale.” The library came to be viewed as a part of the laboratory, which meant that even greater support for the library was generated. “Scientists saw no essential difference between the books and the other equipment which should be at hand while they prosecuted their researches,” one historian has observed, and the departmental library could fill this need. The 1891–92 Kansas catalog devoted two pages to describing engineering laboratories, shops, and equipment, concluding, “The technological portion of the University library contains about 2,000 volumes, while in the reading room are found the leading American and foreign engineering journals.” A

decade later more than three pages were devoted to the topic, only the library was then listed first.<sup>51</sup>

### *A New Emphasis on Faculty Research*

The view of the library as adjunct to the laboratory spread as faculty research grew. Whereas prior to 1900 teaching consumed all of the faculty's time, in later years research gained increasing attention.<sup>52</sup> In 1906 Marvin wrote:

Indeed, there is hardly an institution of any great importance that is not doing some practical research work.

While the University of Kansas has done something along this line . . . the applied science men of its faculty have been too much occupied with the teaching function and too poorly supplied with space, equipment and money to warrant much development in this way. . . .

[The writer] further believes that every college of engineering, to rightfully fulfill its mission to both pupil and public, should include both functions, that of teaching and that of doing research work.<sup>53</sup>

The emphasis on research was encouraged by efforts to make engineering more scientific. By-products included the establishment of learned societies, laboratories, and research journals. An educator commented in a 1900 SPEE publication: "Frequent reports of the results of such work are seen in the technical press and in technical society proceedings. Also most engineering schools maintain regular publications, in which the results of many experimental investigations by both faculty and undergraduates are reported." Faculty demanded that these publications be available in the library. As Blake and Haworth did at Kansas, graduate students from universities with research collections, upon gaining faculty appointments elsewhere, expected them at their new institutions, too.<sup>54</sup>

At Kansas, several organizations encouraged research. Phi Beta Kappa and Sigma Xi both received charters in 1890, and Marvin became Sigma Xi's national president in 1909–10. In 1906 he was president of the Kansas Academy of Science. Its *Transactions* were an important outlet for engineering faculty research; in them Marvin published eight papers between 1890 and 1909. One of these, his presidential address, included his last published statement on the cultured engineer's executive potential.<sup>55</sup> Another campus agency was the nonprofit research institute, newly

created to serve the needs of industry. “The most prominent pioneer in transplanting this system [from Europe] to the United States was Robert Kennedy Duncan, professor of industrial chemistry at the University of Kansas”; his primary appointment from 1906 to 1913 was in chemistry, but he was also listed among the engineering faculty.<sup>56</sup> Faculty research gained additional opportunities through the creation of engineering experiment stations. Kansas’s station was typical. Established in 1908, it was “designed to undertake the study of scientific problems of direct interest to engineers and to industries of the state.” A 1913 report on the station’s activities noted that “a good library is an essential part of the equipment of any experiment station.”<sup>57</sup>

Marvin’s commitment to faculty research undoubtedly had the encouragement of Frank Strong, the university’s chancellor from 1902 to 1920. In his inaugural address, after acknowledging past accomplishments of engineering and other departments, Strong pointedly said, “I believe, however, that the University should look for a considerable growth in research work and publications.” He added, “In this connection, I am profoundly impressed by the conviction that one of the most important considerations in the growth of the University is the library. The library is the foundation, the general workshop and laboratory of the modern university.”<sup>58</sup>

### *Institutional Competition and the Model of Other Libraries*

Strong’s comments closely followed a tremendous expansion in higher education in the 1890s, and, as one historian has noted, this led to increasing competition:

The creation of new and the enlargement of existing universities, first of all, considerably increased the density of the university network. More frequent and numerous points of contact between institutions had the incidental effect of heightening the sense of competition between schools. This was above all competition for prestige—an ineffable combination of publicity, peer esteem, and pride. . . . Behind the competition for prestige, however, lay a truly vital endeavor to secure the resources necessary for growth and progress.<sup>59</sup>

As one writer has observed, “Soon the leading public university in one state had to be better than counterparts in neighboring states.”<sup>60</sup>

Strong was intensely concerned about Kansas’s standing among its rivals:

The University of Kansas is still in about the third class of universities as to income, having much less than half the income of the University of Missouri, our chief competitor. Because the funds of the University have never been anywhere near adequate to the whole needs of the institution, the University of Kansas has had to suffer the humiliation of falling far behind institutions with which it was once on even terms.<sup>61</sup>

In engineering, declared one leading professional magazine, “technical schools and colleges are vying with each other to provide the best courses, the best instructing talent and the best mechanical facilities, so much so that it perplexes the student to select the institution which can offer him the most.”<sup>62</sup> For example, early programs in electrical engineering, as at Kansas, were housed in physics departments. When in 1886 the University of Missouri elevated its program to departmental status, Kansas followed suit the next year.<sup>63</sup> Academic historians note that libraries, too, had competitive value: “By the end of the 1800s . . . the competition among universities for outstanding faculty members was intense. The availability of a strong library was a decided asset in faculty recruitment. . . . Having one’s own departmental collection was an indicator of success in a fiercely competitive academic environment.”<sup>64</sup>

Other universities preceded Kansas in establishing engineering libraries, and it is likely their accomplishment aroused Marvin’s envy and competitive spirit. SPEE conferences, often held near universities, some of which had engineering libraries, provided opportunities for him to see the possibilities firsthand. Columbia, Cornell, and MIT are examples. New engineering buildings at other universities received prominent press coverage, which Marvin would have seen. When Illinois, Wisconsin, Michigan, and Pennsylvania opened new engineering buildings, all included libraries.<sup>65</sup> And Marvin certainly would have known about the libraries set up by his rivals at neighboring universities Nebraska, Iowa State, and Missouri (see the appendix).

### **Why an Engineering Library at Kansas?**

#### **Frank O. Marvin as the Explanation**

“The cultured man . . .,” Marvin wrote, “makes of his books friends that are life long, that cheer and console him under all happenings, adding much to his internal resources for happiness.”<sup>66</sup>

Marvin wished to pass on to his students his appreciation of the value of books to the cultured engineer. He found inspiration in his personal



library, which, besides the usual professional and technical volumes, included a significant collection of art books. Marvin had compiled this collection very carefully, especially on the subjects of etching and printmaking. Its more than three hundred volumes ranged from illustrated books in fine bindings to catalogs and technical manuals. Marvin kept up with the artistic currents of his time and was considered to be the owner “of one of the finest private art libraries in the West.”<sup>67</sup> Marvin’s collection of art books complemented his print collecting; he owned at least one hundred etchings by Rembrandt, Whistler, Haden, and others.<sup>68</sup> The collection also supported his own etching and printmaking activities; 127 of Marvin’s works are today in the university’s renowned Spencer Museum of Art, and a number of these have been published.<sup>69</sup>

In 1896 Marvin, then vice president of AAAS and chairman of Section D—Mechanical Science and Engineering, gave an address entitled “The Artistic Element in Engineering.” Like “Common Requirements” before it and “Cultural Value” afterward, it sounded the theme of the cultured engineer’s executive potential. “The Artistic Element” was unique, however, in its focus on the aesthetic element in engineering.

The engineer is primarily a designer. He works with the materials of Nature as his medium and her powers as his tools wherewith to express his thought and his purpose to serve and benefit man. . . . In this process of creating something of value, something that helps man to a fuller, richer, and better life, the artistic cannot be left out. . . . In a certain sense, then, every engineer is an artist.

To this end he must give preliminary study and thought to the principles of aesthetic design, so gaining an intellectual knowledge of them. American engineering schools are doing little or nothing to help the young engineer to this. So far as the writer knows, there is but one American textbook, Professor Johnson’s book on bridges, that includes any discussion of the matter. A course of study in engineering aesthetics near the close of college life would be a great help and stimulus to a young graduate. . . . With such engineers and an appreciative clientele American engineering would be artistic.<sup>70</sup>

No course on engineering aesthetics was offered at Kansas during Marvin’s lifetime. However, he did invite the eminent architecture critic Russell Sturgis to deliver a paper at SPEE in 1901, the year Marvin was president. “The engineer is more of a creator than the architect,” Sturgis

proclaimed. Marvin's thinking must have resonated with engineers at the time, for the *Engineering News* accompanied its reprinting of "The Artistic Element" with a lengthy, approving editorial.<sup>71</sup>

Marvin's recommendation of "Professor Johnson's book on bridges" refers to J. B. Johnson's *The Theory and Practice of Modern Framed Structures* (New York: Wiley, 1893), specifically chapter 16, "The Aesthetic Design of Bridges" by David A. Molitor. Marvin further illustrated his point with a list of American engineering designs of aesthetic quality that he found in the recent professional literature. One example was suggested by the article "Melan Concrete and Steel Arch Bridge, Topeka, Kansas" in the April 2, 1896, issue of the *Engineering News* (220–21): "Arch forms [in bridges], either braced or of the suspension type, are naturally pleasing and best adapted for artistic expression. . . . There is some tendency toward the use of curved chords in bridges designed for urban use, and a further evidence of interest in the curved line through the introduction of the Melan arch."<sup>72</sup>

The published engineering projects described in "The Artistic Element" provided a means for Marvin to introduce his students to aesthetic concepts and to demonstrate the connection between engineering and art. It was said of Marvin that "no man was better fitted than Frank Marvin to plant in his boys the desire for the fine things of life."<sup>73</sup> For him, art and books were two of the finest. Although Marvin's art and art books were beyond his students' range, engineering and engineering books were not. *Of course* he would have a library in his engineering building; the library conveyed an aesthetic value central to his vision of the well-educated engineer.

When the new engineering building was designed in 1908, the state architect produced the construction drawings, but Marvin surveyed the site and laid out the floor plans. The library, Room 119, occupied about 1,265 square feet in the northwest corner of the first floor (Marvin's office, also on the first floor, was in the northeast corner). The room was lighted by nine large windows on the north and west sides. It was divided into a study area containing eight-place tables with total seating for fifty or sixty readers on the west and an area for the stack (four ranges of five sections each), the librarian's desk, and the door on the east.<sup>74</sup> In September 1909 the civil and mechanical engineering books in Spooner Library and the electrical engineering books in Blake Hall were moved to the new engineering library, about fifteen hundred volumes in all. Marvin considered these only part of the library resources for engineering, however. "The scientific portion of the general University library directly

relating to engineering contains about 14,000 bound volumes and some 300 American and foreign engineering and scientific journals.”<sup>75</sup>

Marvin expressed professional satisfaction with the outcome.

For the first time in its history the School has this year become possessed of a home of its own. . . . A general Engineering Building . . . provides for class rooms, drawing rooms, blue-print rooms, offices, library and reading room, and laboratories for various purposes. So far as possible all class work for engineers has been moved into this building, including the mathematics and language work. . . . All books relating to Civil, Electrical and Mechanical Engineering have been moved from Spooner Library to the Library in the Engineering Building.

Upon its dedication, the building was named Marvin Hall.<sup>76</sup>

In 1914, as his health declined, Marvin donated his professional library to the School of Engineering. The collection comprised about 568 volumes of journals and books, nearly all dating from his years of teaching. There was a small group of mid-nineteenth-century works on railroads and a few miscellaneous titles published earlier but otherwise little indication of Marvin’s bibliophile collecting. In 1918 the university purchased Marvin’s art books from his widow, Josephine Belle March Marvin.<sup>77</sup>

## Conclusion

Traditional explanations for the establishment of departmental libraries have emphasized the inconvenience of the general library, especially its distance from users and the adequacy of its facilities. For engineering, at least, more endemic factors were also at work. They included the growth of the profession, innovations in teaching, new opportunities for research, the imperative of institutional advancement, and the influence of personalities. The external forces that affected Kansas—national developments in engineering education and the engineering profession—were, of course, present at other institutions, too. Yet some institutions did not establish engineering libraries until much later, if at all.

External forces, therefore, did not by themselves result in a library. Did schools where engineering libraries failed to appear soon after the external forces were felt lack faculty sponsors in influential positions? Marvin was not unique. In the late nineteenth and early twentieth

centuries many individual faculty members played new and important roles in library development, yet even within their own institutions this is often forgotten. "A full accounting of the development of research university libraries in the United States requires a recognition of the roles played by specific faculty members (renowned or not)."<sup>78</sup> There must have been leaders like Marvin at other engineering schools across America who are now awaiting discovery and recognition.

At Kansas, the more important factors were those magnified by Marvin's personal associations: the standard set by scientist colleagues Lucien I. Blake and Erasmus Haworth, the competition with other schools led by chancellor Frank Strong, and Marvin's appreciation of books and libraries implanted by his undergraduate teacher Jeremiah Tingley. More important even than these was a factor for which there was a different kind of personal connection. Independently conceived by Marvin and refined over a lifetime, it was a vision of the successful engineer as a liberally educated and cultured executive, a man not unlike Marvin himself.

The vision, however, was not about himself. Certainly, Marvin, dean for twenty years, active professional consultant, and elected leader of three national societies, *was* a successful engineer and executive. But personal success was not what "caused him to put aside all thought of fame or fortune and wear himself out in the service of the boys."<sup>79</sup> Rather, according to a colleague, "the great joy of his life was to watch his boys—as he called them—develop, and when one made good it was a matter of personal joy to him."<sup>80</sup> Another recalled, "He had not children of his own, and in a very real sense his 'boys' stood to him in their place, and he gave to them in unstinted measure as a father gives."<sup>81</sup> In 1915 a colleague declared, "He presented to every student an example of what a man and an engineer should strive to attain, not only as an engineer but as a broad minded cultured leader of man."<sup>82</sup> The library was, in essence, one of the lessons he gave "his boys." He did not think of the library in terms of economic efficiency, which among American engineers of the time was the principal test of a good design. Rather, he saw the library functionally and aesthetically as an essential element in "the engineering of men, the building of engineers."<sup>83</sup>

## Notes

I would like to thank the following University of Kansas faculty and staff for their encouragement and assistance: William J. Crowe, Spencer Librarian, Kenneth Spencer Research Library; Carl E. Locke, Jr., dean emeritus, School of

Engineering; Jeff McAdams, library assistant, Spahr Engineering Library; and Kathleen L. Neeley, assistant archivist, University Archives, Kenneth Spencer Research Library.

1. *Graduate Magazine of the University of Kansas* (hereafter referred to as *GM*) 8, no. 6 (1910): frontispiece. For other photographs of Marvin see James O. Maloney, ed., *A History of the School of Engineering at the University of Kansas, 1868–1988* (Lawrence: University of Kansas School of Engineering, 1989), 8, 128.

2. Quotations from *Report of the Board of Regents of the University of Kansas*, 1906, 5, 9. For additional details about the school's needs see 11–14.

3. For a recent review see Leon Shkolnik, "The Continuing Debate over Academic Branch Libraries," *College & Research Libraries* 52, no. 4 (1991): 343–51. Perhaps because case studies have been lacking, this adds little insight to the analysis made eighty years earlier by Henry E. Bliss, "Departmental Libraries in Universities and Colleges," *Educational Review* 43 (January–May 1912): 387–409.

4. I have found no such studies of academic engineering libraries. Published histories of early engineering libraries in university settings include Caroline E. Laird, "Historical Sketch of [the Iowa State University] Engineering Library," *Iowa Engineer* 17, no. 5 (1917): 165–68; and Natalie N. Nicholson, "The Engineering Library at Harvard University," *Harvard Library Bulletin* 1, no. 3 (1947): 387–90. Several histories have appeared on institutional web sites, for example: "The College of Engineering Library at the University of Cincinnati, Eighty-Eight Years: 1916–2004," April 19, 2004, University of Cincinnati, <http://www.libraries.uc.edu/libraries/engr/about/history/index.html>, accessed June 14, 2007; "Grainger Library and the Early History of the University of Illinois," University of Illinois at Urbana-Champaign, <http://web.library.uiuc.edu/grainger/building/site.htm>, accessed June 14, 2007; "A Brief History of the Engineering Library at Iowa," University of Iowa, <http://www.lib.uiowa.edu/eng/history.html>, accessed June 14, 2007; "History of the McKinney Engineering Library," University of Texas at Austin, <http://www.lib.utexas.edu/engin/history/index.html>, accessed June 14, 2007. None of these, however, attempts to explain why the library was created.

5. Henry Earle Riggs, "Memoir of Frank Olin Marvin," *Transactions of the American Society of Civil Engineers* 92 (1928): 1720–23. This memoir, focusing on Marvin's career, together with Riggs's "Frank Olin Marvin," *GM* 13, no. 5 (1915): 140–43 (reprinted in *Transactions of the Kansas Engineering Society*, January 19–20, 1915, 7–10), emphasizing his character, provide the fullest account of Marvin's life. For a family reminiscence see Don C. Little, "Dean Marvin as His Sister Tells of Him," *Kansas Engineer* 11, no. 4 (1926): 21–22. This includes a photograph of Marvin and his sister taken in 1871, the year he graduated from college. Marvin's meager personal papers, primarily concerning his artistic and musical activities, are in University Archives, Kenneth Spencer Research Library, University of Kansas (hereafter referred to as UA). See the guide at <http://ead.diglib.ku.edu/xml/ksrl.ua.marvinfrank.html>.

6. Ernest Ashton Smith, *Allegheny—A Century of Education, 1815–1915* (Meadville, Pa.: Allegheny College History Company, 1916), 413–14. Clifford S. Griffin, in *The University of Kansas: A History* (Lawrence: University Press of Kansas, 1974), 137, is mistaken in saying Marvin was "an engineering graduate." Although Marvin received the bachelor of arts, not the bachelor of science,

degree, language, technical, and science requirements predominated (Saul Sack, *History of Higher Education in Pennsylvania* [Harrisburg: Pennsylvania Historical and Museum Commission, 1963], 2:474).

7. Smith, *Allegheny*, 360; Ida M. Tarbell, *All in the Day's Work: An Autobiography* (New York: Macmillan, 1939), 43. Tarbell attended Allegheny from 1876 to 1880. Smith, *Allegheny*, 207–8, 361–62; Barry Gray, "Cataloging the Special Collections of Allegheny College," *Library Resources & Technical Services* 49, no. 1 (2005): 50; Bruce M. Stephens, "Icons of Learning: William Bentley's Library and Allegheny College," *Western Pennsylvania Historical Magazine* 69, no. 2 (1986): 139; U.S. Department of the Interior, Bureau of Education, *Public Libraries in the United States of America: Their History, Condition, and Management; Special Report*, pt. 1 (Washington, D.C.: Government Printing Office, 1876), 1040, 1119; Frank O. Marvin, "Our Wants and Needs," *Kansas Collegiate*, December 13, 1875: 2.

8. Little, "Dean Marvin," 21; Vincent V. Masterson, *The Katy Railroad and the Last Frontier* (Norman: University of Oklahoma Press, 1952), 113, 144; *Quivira* [student yearbook] (Topeka: Hall & O'Donald, 1893), 15, s.v. "Frank O. Marvin"; D. Don Haines et al., "Civil Engineering," in Maloney, *History*, 127–31; and James Earl Sherow, *Watering the Valley: Development along the High Plains Arkansas River, 1870–1950* (Lawrence: University Press of Kansas, 1990), 84.

9. "Deans of the School (1893–1988)," in Maloney, *History*, 7–11; Haines, "Civil Engineering," in Maloney, *History*, 124–27. Maloney's history is encyclopedic but sparsely documented. A much briefer history with sources is Griffin, *University of Kansas*, 136–38, 239, 288–93. Marvin's account appears in "In Retrospect: Engineering Work in the University," his address at the dedication of the new engineering building (*GM* 8, no. 6 [1910]: 197–204). None of these sources makes more than passing reference to the engineering library in the Marvin era.

10. Samuel C. Florman, *The Existential Pleasures of Engineering* (New York: St. Martin's Press, 1976), 4–5.

11. General histories of engineering education that span this period include S. L. Goldman, "Engineering Education and Institutes of Technology: United States," in *The Encyclopedia of Higher Education*, vol. 2: *Analytical Perspectives*, ed. Burton R. Clark and Guy R. Neave (Oxford: Pergamon, 1992), 1106–17; Lawrence P. Grayson, "The Period of Development: 1893–1914," in *The Making of an Engineer: An Illustrated History of Engineering Education in the United States and Canada* (New York: Wiley, 1993), 67–89, notes at 280–81; and David F. Noble, "The Wedding of Science to the Useful Arts—II: The Development of Technical Education," in *America by Design: Science, Technology, and the Rise of Corporate Capitalism* (New York: Knopf, 1977), 20–32, notes at 329–32. An especially detailed report circa 1892, "The Engineering Schools of the United States," is given by the *Engineering News and American Railway Journal* magazine in forty-one installments beginning with the March 19, 1892, issue (277–78) and running approximately weekly through February 9, 1893 (138–40). It includes much comparative data on engineering schools, including the University of Kansas, but nothing about libraries.

12. Ira O. Baker, "Engineering Education in the United States at the End of the Century," *Proceedings of the Annual Meeting of the Society for the Promotion of Engineering Education* (hereafter referred to as *Proc. SPEE*) 8 (1900): 15, table 2 and following text; A. J. Wood, "Report of Committee on Statistics," *Proc. SPEE* 24 (1916): 231. The Mann Report's often-cited figures are 1,400 in 1870 and

33,000 in 1917 (Charles Riborg Mann, *A Study of Engineering Education: Prepared for the Joint Committee on Engineering Education of the National Engineering Societies*, Carnegie Foundation for the Advancement of Teaching Bulletin, no. 11 [1918], 6). Although Mann's data are better known, Baker's and Wood's span a narrower period more pertinent to the present discussion.

13. *Annual Catalogue of the University of Kansas* (hereafter referred to as *UKC*), 1899–1900, 204, table “Growth of Attendance 1866–1900”; *UKC*, 1910–11, 493, table “Summary of Enrollment 1910–11”; *Report of the Board of Regents, University of Kansas*, 1906, 7, table 2, “Summary of Enrollments at the University of Kansas, 1897–98 to 1906–07.” See also Frank O. Marvin, “Recent Growth of Engineering Colleges,” *Transactions of the Kansas Academy of Science* 20, pt. 2 (1906): 23–34, which examines growth and other data at nine prominent schools.

14. *Report of the Investigation of Engineering Education, 1923–1929* (Pittsburgh: Society for the Promotion of Engineering Education, 1930), 1:821, also known as the Wickenden Report.

15. Terry S. Reynolds and Bruce E. Seely, “Striving for Balance: A Hundred Years of the American Society for Engineering Education,” *Journal of Engineering Education* 82, no. 3 (1993): 136–51; quotation from *Investigation of Engineering Education*, 1:548; “Officers,” in *Engineering Education, Being the Proceedings of Section E of the World's Engineering Congress* (Chicago, July 31–August 5, 1893), published as *Proc. SPEE* 1 (1893): inside front cover.

16. Frank O. Marvin, “The Cultural Value of Engineering Education,” *Proc. SPEE* 9 (1901): 13. The address (13–24) was reprinted in *Science*, July 26, 1901, 121–26; *Engineering Record*, July 13, 1901, 32–34; and *Engineering News and American Railway Journal*, July 4, 1901, 12–13 (abridgment). Citations here are to *Proc. SPEE*.

17. Frank O. Marvin, “Common Requirements for Admission to Engineering Courses,” *Proc. SPEE* 2 (1894): 51.

18. Frank O. Marvin, comp., *Papers on Education* (n.p., n.d.), separates bound together in one volume, OCLC 34268300, copy in University of Kansas Libraries; Thomas C. Clarke, preprint of *Transactions of the American Society of Civil Engineers* 3 (1875): 255–59 (paper was read June 10, 1874); “Address of President A. L. Holley, before the American Institute of Mining Engineers, at Washington, Feb. 22d, 1876. . .,” in *Discussions on Technical Education . . .* (New York: American Society of Civil Engineers, 1876), 7–23, a preprint of *Transactions of the American Institute of Mining Engineers* 4 (May 1875–February 1876): 191–207; Edwin J. Holstein and Earl J. McGrath, *Liberal Education and Engineering* (New York: Bureau of Publications, Teachers College, Columbia University, 1960), 25–26, quotation on 25.

19. James C. Nagle, “The Danger of Excessive Specialization in Undergraduate Engineering Courses,” *Proc. SPEE* 9 (1901): 112–27; Mann, *Engineering Education*, 25–26.

20. *UKC*, 1908–9, 184–86; *UKC*, 1914–15, 184–86.

21. Harwood Frost, “The Educational Value of the Technical Press with Special Reference to *Engineering News*,” in *Addresses to Engineering Students*, ed. Waddell & Harrington, Consulting Engineers (Kansas City, Mo.: Waddell & Harrington, 1911), 106–7.

22. Edwin T. Layton, Jr., *The Revolt of the Engineers: Social Responsibility and the American Engineering Profession* (Cleveland: Press of Case Western Reserve University, 1971), 2–4; *Investigation of Engineering Education*, 1:260, table 5.



23. Bliss, "Departmental Libraries," 392.

24. Carrie M. Watson, "History of the Library," in *Quarter-Centennial History of the University of Kansas, 1866–1891*, ed. Wilson Sterling (Topeka: George W. Crane, 1891), 112. For a later account see "Library of the University of Kansas," s.v. "Lawrence," in *Handbook of Kansas Libraries, 1902*, ed. Carrie M. Watson and Edith M. Clarke, *Bulletin of the University of Kansas* 4, no. 6 (1903): 43–50. For a recent view see William J. Crowe, "University of Kansas Libraries," in *International Dictionary of Library Histories*, ed. David H. Stam (Chicago: Fitzroy Dearborn, 2001), 2:840–43.

25. E. Miller, *Catalogue of Books in the State University of Kansas* [Lawrence?], January 1, 1880, 21 pp., UA 32/0, Libraries, Artificial Records, box 1, folder 1879/1880. This is a classed catalog of twenty-two broad subjects, like "Engineering," without subdivisions. Brief title-author entries are arranged by author, but there is no author index. E. Miller, "Librarian's Report," in *Biennial Report of the University of Kansas* (hereafter referred to as *BRUK*), 1881–82, 30.

26. *BRUK*, 1887–88, 52. The list, originally appended to the report, has been lost. The previous annual appropriation for the entire library had been only \$1,000 (35). *Annual Report of the University of Kansas*, 1873, 17; *Report of the Regents of the University of Kansas to the Governor*, 1874, 8–9. In 1889, despite Marvin's plea, civil engineering was allocated just \$150 (Minutes of the Board of Regents, May 1, 1889, UA 1/2, record book); in 1892 civil engineering, \$125, and physics and electrical engineering, \$100 (Watson, "History of the Library," 117–18); in 1900 expenditures for books in civil, mechanical, mining, physics, and electrical engineering totaled \$405 (*BRUK*, 1899–1900, 23–24).

27. Watson, "History of the Library," 112–14; "The Library," *University Courier*, January 4, 1894, 278; *UKC*, 1894–95, 16. The dictionary card catalog, begun in 1885, was not completed until the late 1890s (Minutes of the Board of Regents, September 30, 1884, UA 1/2, record book; "Notes," s.v. "Topeka," *Library Journal* 10, no. 7 [1885]: 158; "The Library," *Weekly University Courier*, August 1, 1885, [3]; *UKC*, 1894–95, 16; *UKC*, 1899–1900, 23; *UKC*, 1903–4, 297). The civil engineering books were "nearly completed" by fall 1896 ("Library," *Kansas University Weekly*, October 31, 1896, 158).

28. "Physics and Electrical-Engineering Building," *UKC*, 1896–97, 14.

29. William J. Hennessey, "The Architectural Works of Henry Van Brunt," Ph.D. diss., Columbia University, 1979, 166; second quotation from David Kaser, *The Evolution of the American Academic Library Building* (Lanham, Md.: Scarecrow Press, 1997), 51, 54.

30. For a discussion of the growth of the library see Frank O. Marvin, "A Brief Survey of the Growth of the University and Its Present Needs," *GM* 5, no. 4 (1907): 121. Marvin would have known that the capacity of the Spooner stack was 100,000 volumes (*BRUK*, 1893–94, 17).

31. W. Dawson Johnston, "Engineering Library Efficiency," *School of Mines Quarterly* 39, no. 1 (1912): 26. The engineering libraries included in the table of statistical data (30) were Columbia, Harvard, Iowa, Michigan, Minnesota, Missouri, Nebraska, Pennsylvania, Wisconsin, and Worcester. Several other libraries are mentioned in the text.

32. Lawrence Thompson, "The Historical Background of Departmental and Collegiate Libraries," *Library Quarterly* 12, no. 1 (1942): 59–67.



33. C. Frank Allen, "Methods of Teaching Engineering: By Text-Book, by Lecture, by Design, by Laboratory, by Memoir," *Proc. SPEE* 7 (1899): 39–40. See also Fred P. Spalding, "The Seminar Method of Instruction as Applied to Engineering Subjects," *Proc. SPEE* 4 (1896): 216–21, discussion, 221–29.

34. *Students Journal*, November 2, 1894, 13; February 1, 1895, 6; March 22, 1895, 5; May 3, 1895, 4; *Kansas University Weekly*, October 11, 1895, 111, March 27, 1896, 159; June 5, 1896, 395; September 26, 1896, 57; William L. Immer et al., "Electrical and Computer Engineering," in Maloney, *History*, 167; "University Organizations: Scientific," *UKC*, 1907–8, 54; "Lectures and Societies," *UKC*, 1909–10, 231; Immer et al., "Electrical and Computer Engineering," 167.

35. Blake developed processes and patents for underwater signaling between ships and, after resigning from the University of Kansas in 1906, became chief engineer for the Submarine Signal Company of Boston. He also developed an electrical ore separator and became director and engineer of the Blake-Morscher Electrostatic Ore Separating Company and the Blake Mining and Milling Company of Denver. These inventions made him financially independent (Immer et al., "Electrical and Computer Engineering," 161–66; *National Cyclopaedia of American Biography* [1922], 18:210–11; M. E. Rice, "The Life of Professor Lucien I. Blake," *Kansas Engineer* 16, no. 3 [1930]: 5–6; Frank Lundy Webster, "Lucien Ira Blake," *GM* 14, no. 8 [1916]: 230–32; Marvin, "In Retrospect," 201).

36. Kenneth E. Rose, "Mining and Metallurgical Engineering," in Maloney, *History*, 275; Raymond C. Moore, "Memorial of Erasmus Haworth," *Bulletin of the Geological Society of America* 44 (1933): 342.

37. Herbert B. Adams, "Seminary Libraries and University Extension," in *Johns Hopkins University Studies in Historical and Political Science*, fifth series, no. 11 (Baltimore, 1887), 7, 11, 18–19.

38. "Physics and Electrical-Engineering Building," *UKC*, 1896–97, 14; "Our Appropriations," *University Courier*, March 16, 1893, 87; quotation from "Physics, Equipment," *UKC*, 1907–8, 189.

39. "Geology and Mining Building," *UKC*, 1909–10, 42; Erasmus Haworth, "A Building for Mining Engineering and Geology," *GM* 5, no. 4 (1907): 127; quotation from "Geology and Mineralogy, Equipment," *UKC*, 1908–9, 131.

40. Mansfield Merriman, "Training of Students in Technical Literary Work," *Proc. SPEE* 1 (1893): 262; second quotation from J. B. Johnson, "Methods of Studying Current Technical Literature," *Proc. SPEE* 1 (1893): 267.

41. First quotation from Frost, "Educational Value," 100; Joshua Eyre Hannum, "History of the *Engineering Index*," *Engineering Index* 1 (1929): xi–xii; second quotation from Johnson, "Methods of Studying," 265–66.

42. Charles F. Burgess, "A Neglected Opportunity in Technical Education," *Proc. SPEE* 9 (1901): 41–47; "Proceedings," *Proc. SPEE* 9 (1901): 3–4; Charles F. Burgess, "The Selection of Technical and Scientific Books," *Library Journal* 27, no. 7 (1902): 56–60, discussion, 147–48; "Report of Committee on Technical Books for Libraries," *Proc. SPEE* 11 (1903): 58–89; "Bibliography, Books in Applied Science," *Library Journal* 29, no. 6 (1904): 333; Charles F. Burgess, "Report of Committee on Technical Books for Libraries," *Proc. SPEE* 14 (1906): 35–81.

43. See, for example, T. J. Johnston, "Engineering English," *Proc. SPEE* 11 (1903): 361–69; quotation from Teresa C. Kynell, *Writing in a Milieu of Utility: The Move to Technical Communication in American Engineering Programs, 1850–1950*, 2nd ed. (Stamford, Conn.: Ablex, 2000), 29–30.

44. Marvin, "Cultural Value," 19.

45. Samuel C. Earle, "English in the Engineering School at Tufts College," *Proc. SPEE* 19 (1911): 35–36; second quotation from J. Martin Tellen, "The Courses in English in Our Technical Schools," *Proc. SPEE* 16 (1908): 67.

46. Robert J. Connors, "The Rise of Technical Writing Instruction in America," *Journal of Technical Writing and Communication* 12, no. 4 (1982): 332; Elizabeth Raymond Raymond, ed., "On the Home Front, 1918: English Professor Frederic N. Raymond Inspects Kansas Waterworks," *Kansas History* 7, no. 2 (1984): 116; Connors, "The Rise," 333.

47. F. N. Raymond, "The Preparation of Written Papers in Schools of Engineering," *Proc. SPEE* 19 (1911): 49; *UKC*, 1909–10, 245; *UKC*, 1913–14, 259; *UKC*, 1914–15, 213; School of Engineering Faculty Minutes, November 11, 1912, 43; UA 21/0/4, School of Engineering, Administrative Committee, Minutes and Records, box 1, record book.

48. Mann, *Engineering Education*, 43; Gaetano Lanza, "Graduating Theses," *Proc. SPEE* 1 (1893): 320–21, 328; Edgar Marburg, "Undergraduate Thesis Work," *Proc. SPEE* 6 (1898): 77; L. F. Van Hagan, "Should Theses Be Required?" *Bulletin of the Society for the Promotion of Engineering Education* 6, no. 2 (1915): 113, 127.

49. Raymond, "Preparation of Written Papers," 53–54; *Kansas Engineer*, no. 2 (1915–16): 73. Graduation theses were later transferred to UA 21/0/5, School of Engineering, Student Papers, Projects (also under the various departments). Examples are given in Charles J. Baer and Robert A. Heacock, "Mechanical Engineering," in Maloney, *History*, 243–44.

50. "The Graduate School," *Kansas University Weekly*, August 2, 1897, 354; *UKC*, 1897–98, 94–95; Bessie E. Wilder, comp., *Theses, 1888–1947*, University of Kansas Publications, Library Series no. 2 (Lawrence, 1949), 180; Haines, "Civil Engineering," in Maloney, *History*, 122; *UKC*, 1908–9, 66–67.

51. *Investigation of Engineering Education*, 1:548; first quotation from Robert Fletcher, "A Quarter Century of Progress in Engineering Education," *Proc. SPEE* 4 (1896): 40; second quotation from Haynes McMullen, "Administration of the University of Chicago Libraries, 1892–1928, Part 1, 1892–1910," *Library Quarterly* 22, no. 4 (1952): 328; "Facilities," *UKC*, 1891–92, 106; "Facilities," *UKC*, 1900–1901, 74–77.

52. Bruce Seely, "Research, Engineering, and Science in American Engineering Colleges: 1900–1960," *Technology and Culture* 34, no. 2 (1993): 345–46.

53. Marvin, "Recent Growth," 31–32.

54. Edwin T. Layton, Jr., "American Ideologies of Science and Engineering," *Technology and Culture* 17, no. 4 (1976): 695; quotation from Anson Marston, "Original Investigations by Engineering Schools a Duty to the Public and to the Profession," *Proc. SPEE* 8 (1900): 237; Wayne A. Wiegand, "Research Libraries, the Ideology of Reading, and Scholarly Communication, 1876–1900," in *Libraries and Scholarly Communication in the United States: The Historical Dimension*, ed. Phyllis Dain and John Y. Cole, Beta Phi Mu Monograph no. 2 (New York: Greenwood, 1990), 78–80.

55. "Iota Chapter, Historical Sketch," in *Sigma Xi, Quarter Century Record and History, 1886–1911*, comp. Henry Baldwin Ward (Urbana: University of Illinois, n.d.), 129–30. Marvin was president of the chapter for ten years. "Introductory Remarks by President Marvin," *Proceedings of the Twelfth Convention of the Society*

of the *Sigma Xi*, December 30, 1910, 3–4; Marvin, “Recent Growth,” 21–34 (pp. 33–34 duplicate pp. 31–32).

56. John Rae, “The Application of Science to Industry,” in *The Organization of Knowledge in Modern America, 1860–1920*, ed. Alexandra Oleson and John Voss (Baltimore, Md.: Johns Hopkins University Press, 1979), 260. See also Arthur E. Inman and James O. Maloney, “The Research Organizations and Research Programs,” in Maloney, *History*, 406–8; *UKC*, 1906–7, 211.

57. Seely, “Research, Engineering, and Science,” 348; first quotation from Marvin, “In Retrospect,” 203; second quotation from George C. Shaad, “The Organization and Work of the Engineering Experiment Station of the University of Kansas,” *Engineering Bulletin*, no. 4, pt. 1 (*Bulletin of the University of Kansas* 15, no. 1 [1913], 15).

58. Frank Strong, “Inaugural Address: The Relation of Educational Development to the Problems before the University of Kansas,” *GM* 1, no. 2 (1902): 71, 72.

59. Roger L. Geiger, *To Advance Knowledge: The Growth of American Research Universities, 1900–1940* (New York: Oxford University Press, 1986), 10.

60. Burton R. Clark, *The Academic Life: Small Worlds, Different Worlds* (Princeton, N.J.: Carnegie Foundation for the Advancement of Teaching, 1987), 48.

61. *Report of the Board of Regents, University of Kansas*, 1902–4, 4–5.

62. “A Model College Engineering Building: The New Building for the Civil and Mechanical Engineering Departments at the University of Pennsylvania,” *Iron Age*, October 25, 1906, 1067. See also “A Royal Road to Learning,” *Engineering Record, Building Record and the Sanitary Engineer*, August 27, 1898, 265.

63. Frederick E. Terman, “A Brief History of Electrical Engineering Education,” *Proceedings of the IEEE* 64, no. 9 (1976): 1401; Immer, “Electrical and Computer Engineering,” 163–64.

64. Beverly P. Lynch, “The Development of the Academic Library in American Higher Education and the Role of the Academic Librarian,” in *Leadership and Academic Librarians*, ed. Terrence F. Mech and Gerard B. McCabe (Westport, Conn.: Greenwood Press, 1998), 10, 11.

65. William G. Raymond, dean at Iowa State, put it unequivocally: “There should be a library and reading room” (“Principles Governing the Design and Equipment of Engineering Buildings,” *Proc. SPEE* 13 [1905]: 148).

66. Marvin, “Cultural Value,” 19.

67. Edward Barr, “Frank O. Marvin: Kansas Printmaker,” graduate term paper, 1996, c. 1995, on file in Department of Prints and Drawings, Helen Foresman Spencer Museum of Art, University of Kansas, 5–7, quotation 23.

68. “Etchings and Dry Points from the Collection of F. O. Marvin, Lawrence, Kansas,” in *Catalogue of Paintings and Etchings Exhibited by the Department of Drawing and Painting at the University of Kansas, for Thirty Days Commencing Nov. 9, 1903*, located in *Scrapbooks of Mounted Clippings of Kansas Artists and Musicians*, vol. 1 (The Library, University of Kansas, 1934), Kansas Collection, Kenneth Spencer Research Library, University of Kansas.

69. E-mail message to the author from Kate Meyer, curatorial assistant, Department of Prints and Drawings, Helen Foresman Spencer Museum of Art, University of Kansas, October 12, 2005; Gregory Gilbert, “Frank Olin Marvin,” in *Kansas Printmakers* (Lawrence: Helen Foresman Spencer Museum of Art, University of Kansas, 1981), 20–29, an exhibition catalog including six illustrations; “F. O. Marvin, 1852–1915,” in *American Drawings and Watercolors from the Kansas*

*City Region* (Kansas City, Mo.: Nelson-Atkins Museum of Art, 1992), 210–11, an exhibition catalog including two illustrations; *Kansas Engineer* 15, no. 1 (1929): frontispiece, one illustration. More than one hundred images of Marvin's work are included in the university's digital library.

70. Frank O. Marvin, "The Artistic Element in Engineering," *Proceedings of the American Association for the Advancement of Science* 45 (August 1896): 87, 95–96. The address (85–96) was reprinted in *Science*, September 11, 1896, 321–28; *Engineering Record*, September 12, 1896, 273–75; *Engineering News and American Railway Journal*, September 10, 1896, 166–67 (abridgment). Citations here are to *Proc. AAAS*.

71. Russell Sturgis, "Aesthetics in Engineering Design," *Proc. SPEE* 9 (1901): 210; "The Artistic Element in Engineering" [editorial], *Engineering News and American Railway Journal*, September 10, 1896, 168–69.

72. Marvin, "The Artistic Element," 91.

73. Riggs, "Frank Olin Marvin," 142.

74. Minutes of the Board of Regents, June 14, 1907, 478, UA 1/2, record book; "New Buildings for Engineers," *Kansan*, December 15, 1908, 10. The description of the layout is based on a photograph in Shaad, "Engineering Experiment Station," 15, the only photograph I have found of the library from the Marvin era. Square footage is calculated from measured drawings in UA 0/22/49, Blueprints of Marvin Hall. The seating figure is from "The New Engineering Building," *Jayhawker* 1908 [student yearbook], 6-K. An exterior photograph accompanies Marvin's portrait in *GM*, reprinted in Maloney, *History*, 396. It is a view of the new engineering building taken from the northwest, and the library was in the corner nearest the camera, on the first floor. Maloney (398) barely mentions the library in the Marvin era. A draft entitled "Library Facilities" (UA, 21/0/H, School of Engineering, History—Maloney, box 3; other versions at UA, PP 384, Personal Papers of James O. Maloney) was originally intended as a separate section of the book but ultimately was incorporated elsewhere. It chiefly concerns much later events, especially the Spahr Engineering Library c. 1980–88.

75. "Moving Engineer's Library," *Kansan*, September 25, 1909, 1; "Fitting New Library," *Kansan*, September 30, 1909, [3]; *UKC*, 1909–10, 230.

76. Frank O. Marvin, "University of Kansas School of Engineering," February 4, 1910, a circular accompanying invitations to the dedication, UA 21/0, School of Engineering, Artificial Records, box 1, folder History; "Board of Regents," *GM* 8, no. 5 (1910): 183.

77. "Dean Marvin Left Books," *Kansan*, March 18, 1915, 1; Library Accession Book, October 1, 1914–April 27, 1915 and May 27, 1915–July 3, 1915; "Art Books from Marvin Collection Purchased," *Kansan*, February 20, 1918, 4; Library Accession Book, January 1, 1919–March 13, 1919 and May 5, 1919.

78. Marvin D. Leavy, "Faculty Involvement in Early Research University Libraries: The Case of the University of Chicago, 1892–1912," *Libraries & Culture* 30, no. 1 (1995): 64.

79. Riggs, "Frank Olin Marvin," 141.

80. R. A. Rutledge, "The Engineering Department of the University of Kansas," *Kansas Engineer*, no. 5 (1918–19): 63.

81. W. C. Hoad to Henry S. Pritchett, January 19, 1914 (copy), 2, UA 2/8/2, Chancellor's Office, Frank Strong, Correspondence, Faculty, box 7, folder H.

82. T. J. Strickler, in *Dedication of the Memorial Portrait Bust of Dean Frank Olin*

*Marvin*, June 8, 1915, a printed program accompanying the ceremony, [18], UA 21/0, School of Engineering, Artificial Records, box 1, folder History.

83. Riggs, "Memoir of Frank Olin Marvin," 1720. Upon Marvin's retirement a bronze bust was commissioned in his honor. Fittingly, it was placed not in the building's entry but in the library, where it remains today ("Presentation of the Marvin Portrait," *Kansas Engineer*, no. 1 [1914–15]: 102–3).

### **Appendix:** **Engineering Libraries at American Universities before 1910**

This list consists of universities with engineering libraries established prior to the one at Kansas for which I could find a published date of their appearance. The purposes of the list are to document a national trend toward departmental libraries for engineering in the late nineteenth and early twentieth centuries and to give examples that may have influenced Marvin. The list does not presume to be complete or to establish definitive start dates. Institutions are listed in the order they are mentioned in the text.

*Columbia University*. Established a separate engineering library in the School of Mines by 1865. A departmental library for mechanical engineering opened in 1896.<sup>1</sup> SPEE conferences were held in Brooklyn in 1894 and in New York in 1900 and 1909. Marvin attended the 1894 and 1900 meetings and probably attended the one in 1909, too.<sup>2</sup>

*Cornell University*. Had a library and reading room serving mechanical engineering by 1893.<sup>3</sup> Ithaca was the site of the SPEE conference in 1906, which Marvin attended.<sup>4</sup>

*MIT*. Had an engineering library by 1893.<sup>5</sup> The SPEE conference of 1898 was in Boston, and Marvin attended.<sup>6</sup>

*University of Illinois*. In 1894 dedicated its new engineering building, and a library was included.<sup>7</sup>

*University of Wisconsin*. Built a new engineering building in 1900. A "reading room and duplicate technical library" were included.<sup>8</sup>

*University of Michigan*. Opened its new engineering building in 1904. "[Dean] Cooley had his own 3,500-volume Engineering Library."<sup>9</sup>

*University of Pennsylvania*. Opened a new engineering building in 1906. "On the second floor a reference library and reading room occupy the central space at the front of the building."<sup>10</sup>

*University of Nebraska*. Consolidated its civil, electrical, and mechanical engineering libraries in 1899 and relocated them to its new Mechanic Arts Hall.<sup>11</sup>

*Iowa State University*. Through the determination of Dean Anson Marston, opened a library on the third floor of Engineering Hall in 1906.<sup>12</sup>

*University of Missouri.* Established a library in 1905 in the Engineering Building's west annex. "It was soon moved to its present location in the room opposite the front entrance to the building."<sup>13</sup>

*University of Kansas.* Opened an engineering library on the first floor of its new engineering building in September 1909.<sup>14</sup>

### Notes to Appendix

1. James Kip Finch, *A History of the School of Engineering, Columbia University* (New York: Columbia University Press, 1954), 111; Winifred B. Linderman, "History of the Columbia University Library, 1876–1926," Ph.D. diss., Columbia University, 1959, 226.

2. *Proc. SPEE* 2 (1894): 39–58; *Proc. SPEE* 8 (1900): 6, 8.

3. R. H. Thurston, "Technical Education in the United States: Its Social, Industrial, and Economic Relations to Our Progress," *Transactions of the American Society of Mechanical Engineers* 14 (1893): 985–86.

4. *Proc. SPEE* 14 (1906): 7, 124.

5. *Massachusetts Institute of Technology, Boston: A Brief Account of Its Foundation, Character, and Equipment, Prepared in Connection with the World's Columbian Exposition* (Boston: The Institute, 1893), 17.

6. *Proc. SPEE* 6 (1898): 7–8.

7. "The New Engineering Building at the University of Illinois," *Engineering News and American Railway Journal*, November 15, 1894, 400.

8. J. B. Johnson, "The New Engineering Building of the University of Wisconsin," *Journal of the Western Society of Engineers* 5, no. 3 (1900): 189, 190; plan, 188.

9. Kent Sagendorph, *Michigan, the Story of the University* (New York: E. P. Dutton, 1948), 204.

10. "A Model College Engineering Building: The New Building for the Civil and Mechanical Engineering Departments at the University of Pennsylvania," *Iron Age*, October 25, 1906, 1067, 1069, plan, 1068.

11. *Hesperian*, January 6, 1899, 6, quoted in Sharon McCaslin, "The Development of a University Library: The University of Nebraska, 1891–1909," Ph.D. diss., University of Nebraska, 1987, 193. A photograph of the library in 1904 appears in A. John Boye, *One Hundred Years of Excellence: The Department of Electrical Engineering at the University of Nebraska, 1895–1995* (Lincoln: Department of Electrical Engineering, University of Nebraska–Lincoln, 1997), 29.

12. Herbert J. Gilkey, *Anson Marston: Iowa State University's First Dean of Engineering* (Ames: Iowa State University College of Engineering, 1968), 74; Caroline E. Laird, "Historical Sketch of [the Iowa State University] Library," *Iowa Engineer* 17, no. 5 (1917): 165.

13. Henry Ormal Severance, *History of the Library, University of Missouri*, *University of Missouri Bulletin* 29, no. 22, Library Series no. 15 (Columbia, 1928), 64.

14. "Moving Engineer's Library," *Kansan*, September 25, 1909, 1; "Fitting New Library," *Kansan*, September 30, 1909, 3.